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Rural Water Supplies in South Dakota : Hamlin County

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Rural Water Supplies in South Dakota

HAMLIN County

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RURAL WATER SUPPLIES

IN

SOUTH DAKOTA

HAMLIN COUNTY

BY

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AND

ELMER E. MELEEN

PREPARED BY THE WORK PROJECTS ADMINISTRATION AS A REPORT ON THE WELL SURVEY CONDUCTED AS WORK PROJECTS ADMINISTRATION OFFICIAL PROJECT 665-74-3-126; SPONSORED BY THE EXTENSION SERVICE AND THE EXPERIMENT STATION SOUTH DAKOTA STATE COLLEGE, IN COOPERATION WITH THE STATE GEOLOGICAL SURVEY.

JANUARY 1940

FORWARD

This study was first proposed as a project of the Mineral Resources Committee of the State Planning Board under the direction of the State Geological survey and undertaken as a Work Projects Administration project sponsored by the State Planning Board, and was continued under the Planning Board until that body was abolished July 1, 1939 by the State Legislature. At that time sponsorship was transferred to the South Dakota Agricultural Experiment Station and the State College Extension Service, South Dakota State College. Field work was begun October 1, 1938 and was practically completed by February 15, 1939. Workers were assigned in the several counties under the supervision and direction of the County Agricultural Agents and Field Supervisors who were employed by the Work Projects Administration. Questionnaires were mailed out from the offices of the County Agents and were checked and tabulated in these offices. The material was then forwarded to the central office for final tabulation and analysis under the direction of Elmer E. Meleen and Walter V. Searight.

Particular credit should be given to the individual County Agricultural Agents in the various counties of the state who arranged the contacts with the individuals from whom these data were collected, furnished a large portion of the necessary supplies for field work, and directed the workers engaged in collecting field data. Without this assistance in gathering basic data, this study could not have been conducted. The value of the report is therefore in direct proportion to the accuracy and adequacy of these basic data.

INTRODUCTION

PURPOSE

This report on rural water supplies of South Dakota has been prepared to present data recently made available on the types and the sources of water supply, exclusive of stream, lake and dam waters. The information presented is of importance to evaluate present supplies. It should also prove useful as a basis for further development of supplies where they are needed or become necessary. Further, it is hoped that the facts presented may prove of value in any program of water conservation.

SOURCES OF INFORMATION

Questionnaires were sent to all, or essentially all of the farmers of the state, asking for complete data on farm wells and supplementary supplies, with the exception of the supplies above noted. A most gratifying number returned questionnaires, actually 60.1% average for the entire state. The coverage is probably more than 60.1% since it is likely that many unanswered inquiries were those to farmers who were without wells, the type of supply emphasized in the questionnaires. The data thus obtained were supplemented with information contained in the files of the State Geological Survey, the office of the State Engineer, and reports of the United States Geological Survey. This supplementary information, together with that contained in questionnaires was used in making the well location maps included in this report.

PRODEDURE

All data from the questionnaires were tabulated and analyzed statistically by counties, which were made the areal units of study. Within the county,

Acknowledgments - The authors wish especially to acknowledge and commend the conscientious assistance of Mr. E. L. Woodburn, Supervisor, for careful and painstaking supervision of statistical work. The authors also desire to express appreciation for the constant interest and support of this project by Mr. Bob Butts, Director of Research and Records Projects, South Dakota Work Projects Administration.

supplies were allocated as to kind on county maps. Since shallow waters are the most important source of rural supply in South Dakota, wells 200 feet deep and less were plotted on county maps from which maps indicating depths of wells by 50 foot intervals were made. Springs, shown on the well location map, and cisterns were also tabulated as important supplementary supplies, although the latter do not appear on maps or in the tables in this report.

PRESENTATION OF DATA

For convenience and utility, this report has been divided into sections each covering one county, and each county section bound separately. Each county report contains the following material wherever possible.

1. Well Location Map: This map shows the location of all wells and springs within the county, so far as information is now available. These have been plotted in such a manner that artesian and shallow wells can be differentiated readily by the reader. Artesian wells, where they occur, are divided into flowing and pumped. Artesian wells showing decreased flow and those reported as controlled are also indicated by symbols. Shallow wells are differentiated as adequate and inadequate, and dry holes as of 1938 are located. Wells from other sources of information other than questionnaires collected by this survey are shown in blue.

2. Shallow Well Map: This map shows, as accurately as possible, in 50 foot intervals, the depths at which shallow supplies are commonly obtained. Where shallow wells are abundant, as indicated by the well location map, the map is as accurate as the information on which it is based, but where such wells are sparsely distributed errors are likely to occur. In many places reports of shallow wells are absent in which case the area has been left blank.

3. Table of Pumped Wells, from 0 to 200 feet (inclusive) in depth: This table shows minimum, maximum, and average depths of wells within the county, as reported in the questionnaires. Tabulations are by townships. The general character of the water, hard, medium, and soft, as reported by farm-

ers, and the number of wells suitable or unsuitable for drinking are shown in this table. Further, the adequacy of supply, as indicated on the questionnaires, and use for irrigation are shown here.

4. Table of Wells greater in depth than 200 feet: Minimum, maximum, and average depths are indicated. Character, reported as hard, medium or soft is tabulated. Adequacy and use for irrigation are shown as in the preceding table.

5. Table of flowing wells: Minimum, maximum, and average depths are shown together with general character and use for irrigation. The volume of flow as reported, and the number of flowing wells reported as equipped with control valves is also included in this table.

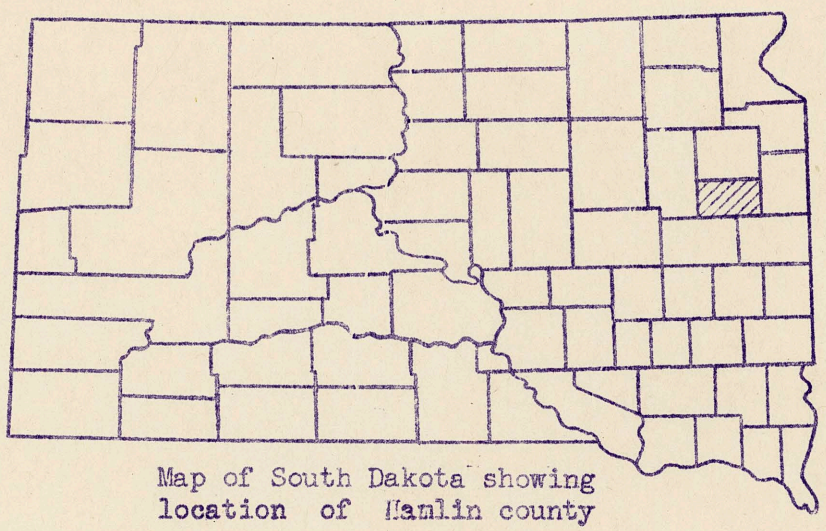
SUMMARY OF STATE SUPPLIES

In the entire state, a total of 48,479 wells were reported in response to questionnaires, returned by 60.1% of the recipients. If those who did not respond have a number of wells in proportion to those who reported, there are approximately 80,000 wells in South Dakota. There are possibly many less than this number since several counties with large numbers of wells returned over 75% of the questionnaires and since many farmers without wells did not reply because they were not requested to do so in the formal questionnaire. Of the wells reported, 16.2% are artesian, including both pumped and flowing wells. Shallow wells are 83.8% of the wells reported. Wells from shallow sources are thus obviously by far the most important means for obtaining water in rural South Dakota.

Important supplementary supplies are cisterns and springs. Roughly, there is more than one cistern to each 40 wells. Many springs are reported, however, in counties with very few wells, so that in some localities they are of considerable importance.

Hamlin County

Hamlin county is in the northeastern section of South Dakota, approximately 22 miles west of the Minnesota state line, and is bounded by the following South Dakota counties; on the north by Codington; on the east by Deuel; on the south by Kingsbury and Brookings counties and on the west by Clark.



Map of South Dakota showing location of Hamlin county

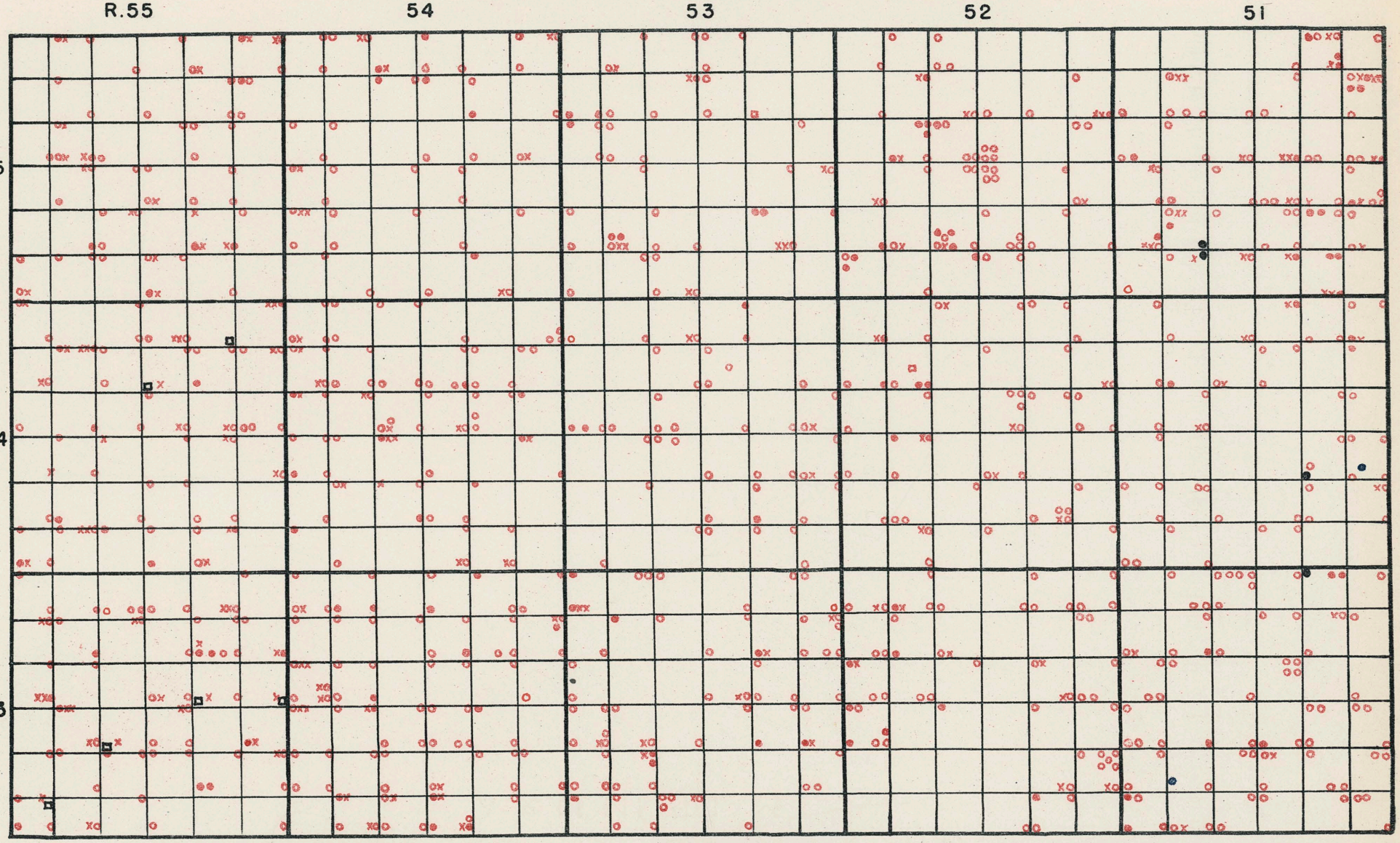
Farms comprise the greater portion of Hamlin county, almost 93 per cent of the area being farmed. Of 1179 farm units, approximately 80 per cent is cultivated land and 15 per cent is in pasture. Corn, oats, wheat, rye, barley, hay, potatoes and flax are the important field crops, the first five being produced in the order named. Livestock raising and dairying are subordinate occupations.*

The importance of livestock, hogs and dairy cattle, in particular, necessitate generally distributed sources of water supply in the county. Supplies required are not great, but adequate and constant supplies of suitable water at relatively low cost are necessary to profitably operate farms of these sizes and organization. The well location map of Hamlin county indicates that, in general, water supplies are available and are widely distributed.

On the well location map all flowing wells, and all deep pumped wells obtaining water from the Dakota-Lakota sandstones are shown in black as artes-

*South Dakota Agricultural Statistics, Annual Report, 1937

LOCATION OF ARTESIAN AND SHALLOW WELLS IN HAMLIN COUNTY



ARTESIAN WELLS
- ● FLOWING WELLS-DECREASED FLOW
- ▯ PUMPED

SHALLOW WELLS
- O ADEQUATE SUPPLY
- ● INADEQUATE SUPPLY
- X DRY WELLS
- □ SPRINGS

● WELLS FROM OTHER SOURCES

ian wells. All other wells are shown in red, and are called shallow wells regardless of depth. On all other maps and in tables the term shallow wells applies to all wells of 200 feet or less in depth, unless otherwise stated. Wells more than 200 feet deep are classed as deep wells and include all artesian wells, except flowing wells 200 feet or less in depth.

DEPTH AND DISTRIBUTION OF WELLS

Most of the rural water supply of Hamlin county is obtained from wells of shallow depths, 200 feet or less.

Wells are reported to be widely distributed over the county. (See well location map.) All townships report an average of more than one well per square mile. Township 113N., R.54W. reports the largest number of wells (74) and T.115N., R.53W. the least with 40 wells.

Questionnaires returned in Hamlin county represent replies from 71.2 per cent of the recipients, and cover 825 wells and two springs. Thirty of those answering the questionnaire reported no wells. Of the total, 696 wells are classified as shallow pumped wells from 0 to 200 feet inclusive in depth. (See table 1 and shallow well map for distribution within townships.) Thus, approximately 85 per cent of all wells reported were shallow.

In one township, T.114N., R.52W., all wells reported were shallow wells.

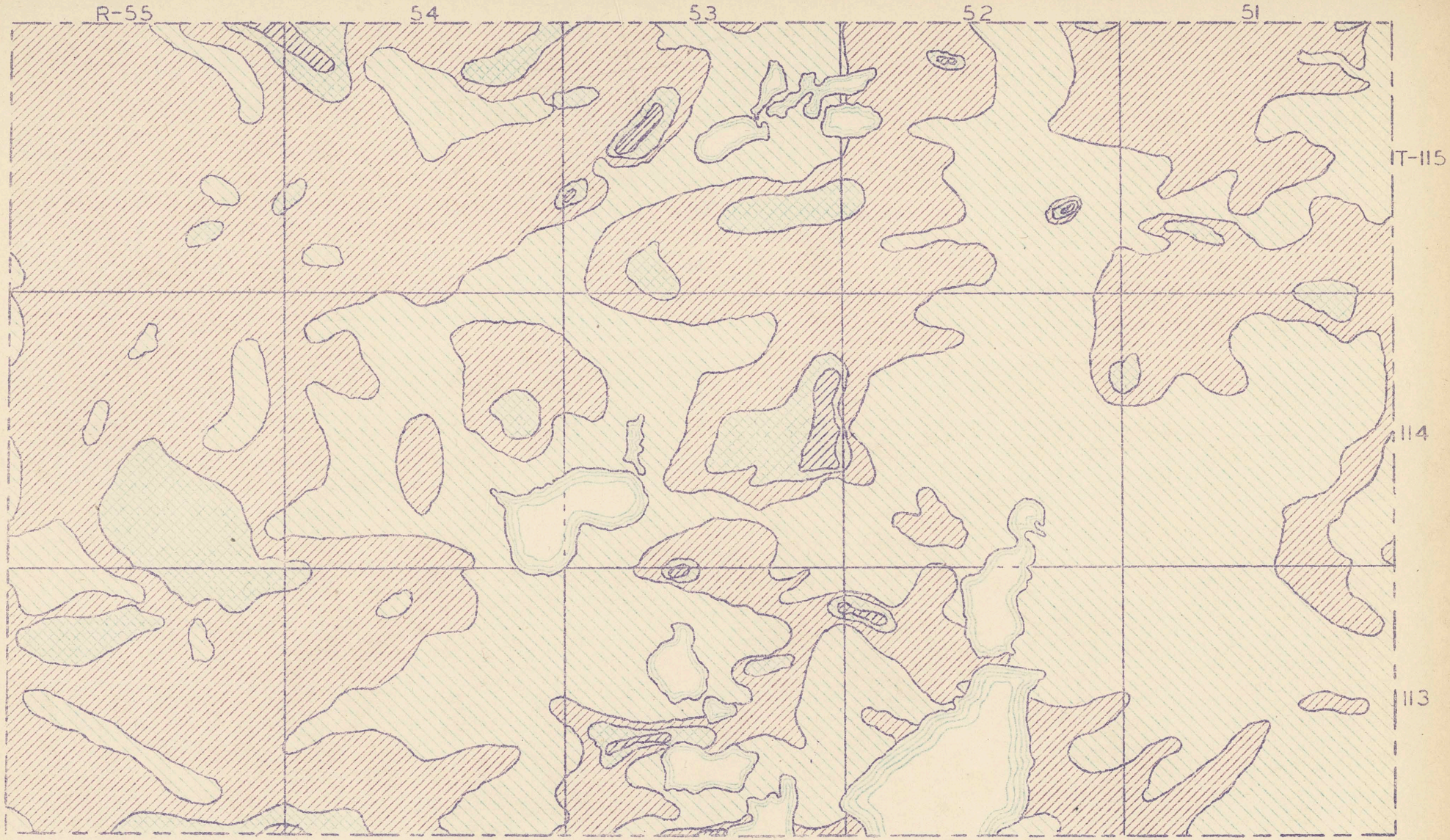
In five townships more than 90 per cent of the wells reported were shallow (average 94.8). These have been tabulated as follows:

Twp.	Rge.	Per cent Shallow
113N	51W	97.2
113	52	96.2
114	53	95.4
115	52	95.
113	53	90.2

Four townships report that between 80 and 90 per cent (average 84.8 per cent) of the wells are shallow. These are tabulated as follows:

Twp.	Rge.	Per cent Shallow	Twp.	Rge.	Per cent Shallow
115N	53W	87.5	114N	51W	82.6
115	54	86.7	114	54	82.6

HAMLIN COUNTY



SHALLOW WELLS (0-200 FT)

DEPTHS AT WHICH SUPPLIES ARE COMMONLY OBTAINED

0-50 FT 50-100 FT 100-150 FT 150-200 FT

LAKES

MILES
0 2 4 6

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Three townships average about 75 per cent (75.2) of all wells as shallow wells. The following table includes these townships with between 70 and 80 per cent of all wells shallow:

T.113N., R.54W. - 78.4% T.115N., R.51W. - 75.7% T.115N., R.55W. - 71.4%

More than 60 per cent and less than 70 per cent of all shallow wells are reported by two townships. These average 64.8 per cent and are tabulated as follows:

T.113N., R.55W. - 67.2% T.114N., R.55W. - 62.5%

Thus, in Hamlin county, more than 60 per cent of all wells reported in 14 townships are shallow wells. This data indicates that, although shallow supplies are available in all parts of the county, it has been necessary or advisable in many instances to go deeper than 200 feet to secure adequate and suitable underground supplies. This is especially true in townships located in range 55, and also in T.113N., R.54W., since more than half of the shallow wells are less than 50 feet deep according to report; 51.2 per cent are less than 50 feet in depth; 37.2 per cent are depths from 50 to 100 feet; 8.2 per cent from 100 to 150 feet in depth, and 3.4 per cent range in depths from 150 to 200 feet. Therefore, approximately 88 per cent of all shallow wells are less than 100 feet in depth.

The shallow well map outlines areas in which wells of the above depths are located and shows where water is commonly obtained at this depth.

Somewhat more than 15 per cent, 15.2 per cent, of the wells reported in Hamlin county, 125 of 825 are deep pumped wells over 200 feet in depth. (See table 2 for distribution by townships.) Four are listed as flowing wells. (See table 3 for distribution by townships.)

Of the flowing wells, two are less than 200 feet deep and both are located in T.115N., R.51W., with depths of 70 and 125 feet. The other two flowing wells are classed as deep (over 200 feet in depth) with depths of 385 and 400 feet. (See table 3).

In some parts of the county deep wells are very important. In two townships, T.113N., R.55W., and T.114N., R.55W., deep wells make up nearly a third or more than a third of all wells and in four townships more than one fifth are deep wells. Only one township, T.114N., R.52W., reported no deep wells. The deep wells, 127 in number, including two flowing, have been tabulated as follows:

Location		Number of	Per cent of	Depths	
Twp.	Rge.	Deep Wells	All Wells	Minimum	Maximum
113N	51W	2	2.8	385	508
113	52	2	3.8	285	320
113	53	6	9.8	205	260
113	54	16	21.6	204	400
113	55	19	32.6	270	1360
114	51	8	17.4	220	475
114	53	2	4.6	240	347
114	54	11	17.4	240	365
114	55	19	36.5	225	1265
115	51	17	24.3	230	525
115	52	3	5.	250	430
115	53	5	12.5	250	498
115	54	3	7.3	220	306
115	55	14	28.6	250	520

No deep wells were reported in T.114N., R.52W. The shallowest deep wells reported were found in T.113N., R.53W., with an average depth of 237 feet. Six wells, all over 1200 feet deep, are located in the following townships:

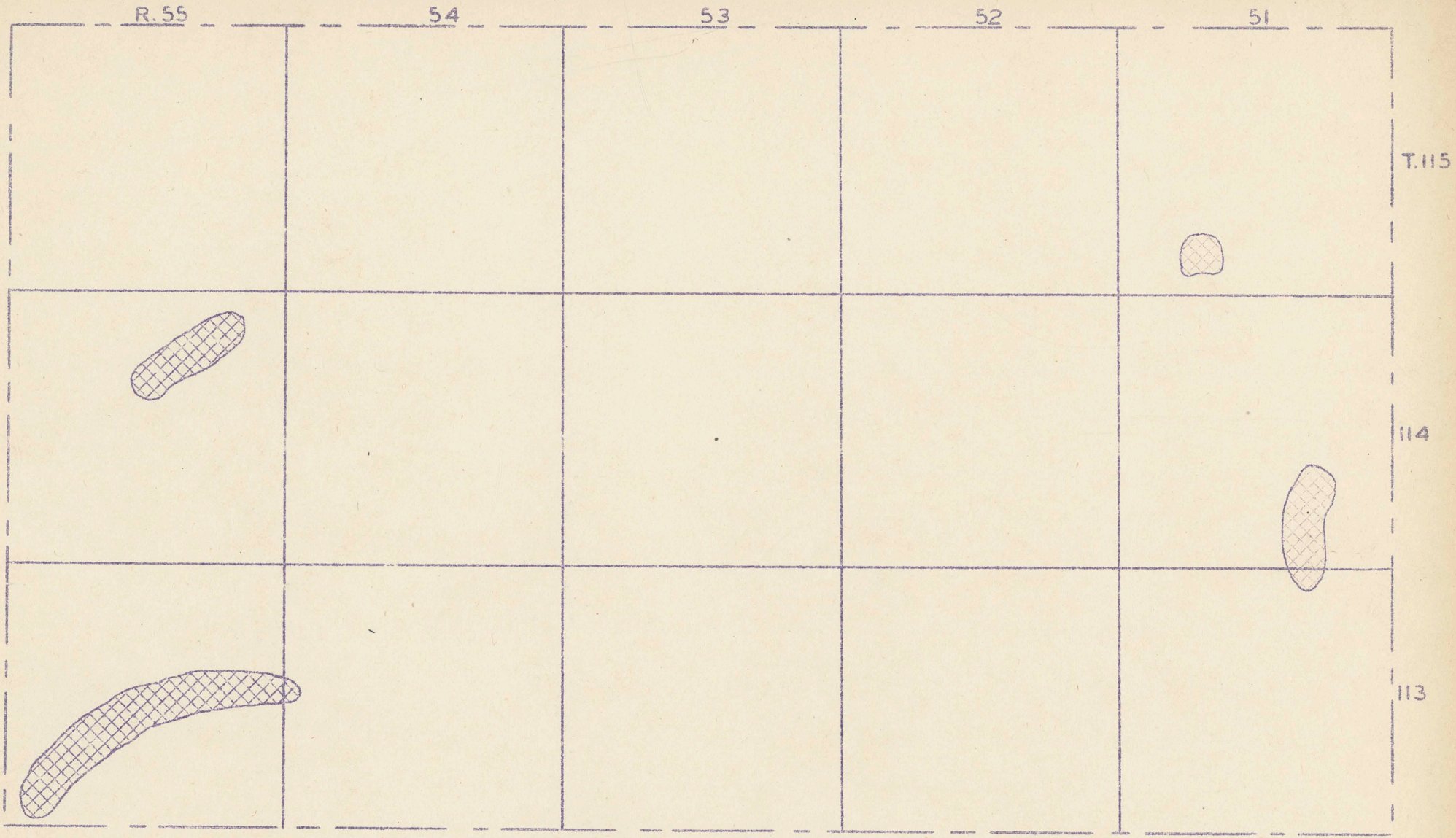
T.113N., R.55W. Four wells with depths of 1260, 1280, 1350 and 1360 feet
114 55 Two wells with depths of 1265 feet each

All flowing wells in Hamlin county reported are in range 51 (see table 3), but the rate of flow was reported for but one which was in T.113N., R.51W. This well had a flow of two gallons per minute but was said to be decreasing in volume.

CHARACTER OF WELL WATERS

The character of well water supplies of Hamlin county has been determined from the opinions of the users. Each farmer was asked, in questionnaires, whether he considered water from his well to be hard, moderately hard or soft and whether it was satisfactory for drinking. Although chemical analyses, the

ARTESIAN AREAS 1938



HAMLIN COUNTY

N

FLOWING WELLS

PUMPED WELLS

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MILES
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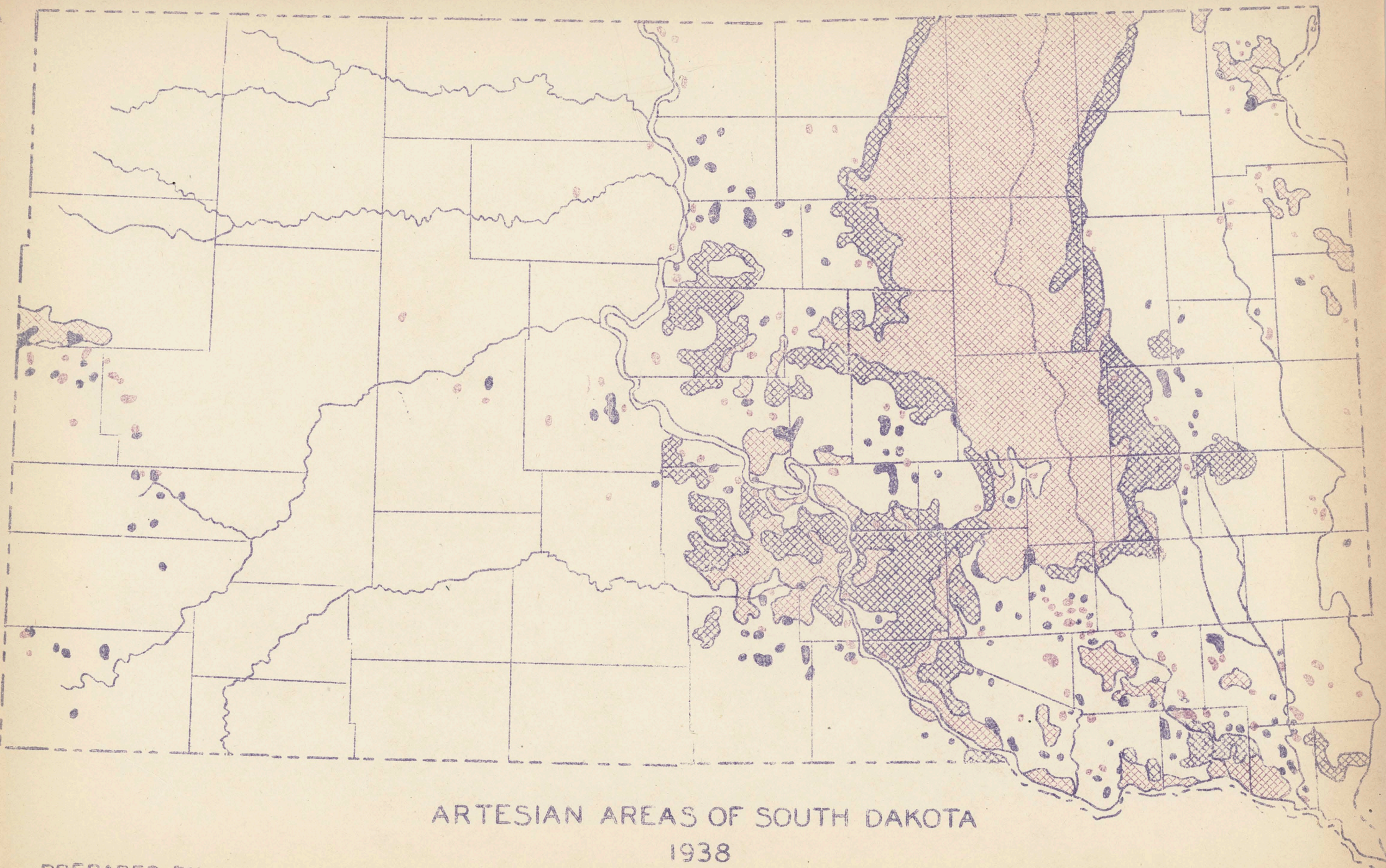

ARTESIAN AREAS OF SOUTH DAKOTA

1938

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W.P. 3636

most satisfactory basis for the determination of the character of waters, are rarely available to farmers it is believed that usage is a fairly good criterion of the general character of water. The well water of Hamlin county, is predominantly hard, as indicated by reports of the users. Considerable variation occurs, however.

Information was received on 578 (83 per cent) wells less than 200 feet in depth. (See table 1). Of these, 48.8 per cent were considered hard and 47.1 per cent were reported to be moderately hard. Thus, 95.9 per cent of the shallow rural wells reported on in the county are considered moderately or definitely hard, and are predominant in every township. The reports also show that hard water may be expected in the majority of shallow wells.

Only 4.1 per cent of the wells reported produced soft water. These wells are scattered throughout the area and are located in every township with the exception of townships in range 55 and in T.115N., R.54W. It is interesting to note that none of the shallow wells over 100 feet in depth reported soft water but at depths of 0 to 50 feet 7.6 per cent of the shallow wells supply soft water, and at depths of 50 to 100 feet, 11.3 per cent were reported to furnish soft water. More soft water wells occur at depths of 50 to 100 feet.

Although hard, most of the shallow wells produce suitable drinking water, according to the replies received. One hundred twenty wells, or 17.3 per cent of the shallow wells reported, were considered unsuitable for drinking purposes. The reports show that wells of depths from 50 to 100 feet produce most of the unsatisfactory drinking water. The percentage at this depth was 61.2 per cent, whereas in wells of 0 to 50 feet the percentage of unfavorable drinking water wells was 28.1 per cent. Depths of 100 to 150 feet was 7.4 per cent and from 150 to 200 feet the percentage was only 3.3 per cent.

Water is unsatisfactory for drinking for one of several possible reasons of which surface contamination and the presence of objectionable compounds are most common. In the case of the high percentages of wells 50 to 150 feet in

depth unsuitability is probably due to the latter. The determination of such compounds must be made by chemical analysis.

Deep pumped wells of Hamlin county are even more notably hard than the shallow wells. Of the wells over 200 feet in depth, the hardness of 120 was reported, whether hard, medium or soft. (See table 2.) The number reported hard comprises 74.6 per cent of the total number of deep wells, while 21.3 per cent were reported to be moderately hard, making a total of 95.9 per cent of all deep pumped wells hard or moderately hard. Only 4.1 per cent were reported soft, and 80 per cent of the soft water from these wells was taken from wells of 1260 to 1360 feet in depth. Thus, only one well, with a depth of 347 feet, located in T.114N., R.53W., and the wells with depths of 1260 to 1360 feet, are listed as supplying soft water.

Forty, or 31.5 per cent of the deep pumped wells, were reported as unsuitable for drinking. Township 113N., R.55W., reports the largest number (9). Unsuitable drinking water wells are most common in townships in the west part of the county.

Waters from flowing wells show the tendency toward hardness of the deep pumped wells. Two were reported hard and two were reported moderately hard. (See table 3). One of the flowing wells in T.115N., R.51W., was reported as unsatisfactory for drinking.

ADEQUACY OF SUPPLY

In response to the questionnaires, farmers of the county reported a water supply adequate for their needs. Of course the needs vary, and reports cannot be interpreted as indicating a sufficient volume of water if changes or expansion in land use are made, or if changes in supply at the source occur.

Shallow supplies, as they are used, are commonly considered adequate. Of the total number of shallow wells reported on, 129 (18.5 per cent) did not supply a sufficient quantity of water for farm use. (Table 1.) Wells with depths

from 0 to 50 feet reported 56, and wells from 50 to 100 feet also reported 56 wells furnishing an inadequate supply which is 86.8 per cent of the total of inadequate wells. Wells from 100 to 150 feet list 16 (12.4 per cent), and depths of 150 to 200 feet reported only one well as inadequate. Thus, 86.8 per cent of the inadequacy is found in all shallow wells less than 100 feet in depth. The inadequate shallow wells are scattered throughout the county with no one location particularly affected. Four townships listed their shallow wells less than 75 per cent adequate. They are: T.114N., R.54W; T.115N., R.51W; T.115N., R.52W, and T.115N., R.53W.

Deep wells appear to have about the same ratio of inadequacy, with 22 wells, or 17.3 per cent, inadequate. (See table 2.) These wells are scattered throughout the county with only three townships reporting none. They are: T.114N., R.51W; T.114N., R.53W and T.115N., R.54W. Township 115N., R.55 W., has 5 inadequate wells or 35.7 per cent of the total which range in depth from 250 to 427 feet. Township 113N., R.51W., reports only one deep, with a depth of 508 feet, which is listed as inadequate.

Waters from flowing wells are reported as adequate.

IRRIGATION

Thirty-six shallow wells are used to irrigate a total of 7 3/4 acres in plots varying in size from 1/8 acre to 1 acre.

Two of the deep pumped wells are used to irrigate garden plots of a total acreage of 1/4 acres.

Three flowing wells were used to irrigate 1 5/8 acres in plots ranging from 1/8 acre to 1 acre in size.

DRY WELL HOLES

In 175 dry well holes, 133 were reported with depths ranging from 10 to 800 feet. Although scattered throughout the county, the largest number per

township are found in the northeast and southwest sections of the county. The depths are recorded as follows:

Depth (feet)	Number	Depth (feet)	Number	Depth (feet)	Number
0 to 50	76	150 to 200	4	400 to 500	1
50 to 100	35	200 to 300	3	500 to 600	3
100 to 150	8	300 to 400	2	800 feet	1

SUPPLEMENTARY WATER SUPPLIES

Over much of eastern South Dakota springs and cisterns are important supplementary supplies. Springs in Hamlin county are relatively unimportant since only two were reported. They are reported in the following townships:

T.114N., R.52W. T.115N., R.53W.

Only one report was made on the character of a spring. It was listed as moderately hard, with an adequate supply of water. A spring in T.115N., R.53W was reported to be used for watering stock and domestic use.

In an area in which water supplies are in large part hard or unsatisfactory for drinking, cisterns are important supplementary supplies. In Hamlin county the common occurrence of hard water and water which is not potable has been noted.

Cisterns are therefore widely used and are reported in all parts of the county. A total of 482 were recorded in the county which is an average of about one cistern to every two wells. Of the total, 442 were used for laundry purposes, and 279, a very large proportion, for cooking and drinking. Eighty six cisterns were supplied by hauling additional water to the rain supply. The report reveals that the percentage of cisterns compared to wells is higher in the townships located within ranges 54 and 55 due to the fact that a larger percentage of inadequate, unsuitable and hard water wells are located in those regions.

HAMLIN COUNTY

Table 1.

DATA ON PUMPED WELLS FROM 0 TO 200 FEET (INCL.) IN DEPTH

LOCATION		Number of Wells	DEPTH OF WELLS			CHARACTER OF WATER					ADEQUACY OF SUPPLY			
Twp.	Rge.		Min.	Max.	Ave.	Hard	Med.	Soft	Corrode Casing	Unsuitable for Drinking	Adequate	Inade-quate	Number used for Irrigation	Approximate Acres Irrigated
113	51	70	10	100	33	13	32	8	1	5	64	6	2	1/8
113	52	50	12	180	51	20	21	1	5	5	43	7	5	-
113	53	55	6	200	56	16	31	1	13	4	47	8	1	1/4
113	54	58	6	125	44	30	21	2	10	13	48	10	3	1/8
113	55	39	14	190	74	26	10	-	7	9	31	8	4	1/8
114	51	38	12	110	45	10	19	1	5	3	34	4	3	5/8
114	52	45	9	120	40	9	22	3	2	1	39	6	4	1
114	53	41	12	190	59	18	17	1	5	4	36	5	2	3/8
114	54	52	12	110	51	25	15	1	11	12	41	11	1	1/4
114	55	33	12	200	73	23	10	-	8	17	22	11	-	-
115	51	51	18	161	66	17	16	3	8	11	34	17	-	-
115	52	56	12	160	58	9	23	2	3	5	42	14	4	3
115	53	35	12	175	67	20	11	1	8	7	26	9	5	1 1/8
115	54	38	20	174	76	22	15	-	7	10	31	7	1	1/4
115	55	35	12	200	66	23	10	-	10	14	29	6	1	1/2
Total		696				281	273	24	103	120	567	129	36	7 3/4

HAMLIN COUNTY

Table 2.

DATA ON PUMPED WELLS OVER 200 FEET IN DEPTH

LOCATION		Number of Wells	DEPTH OF WELLS			CHARACTER OF WATER					ADEQUACY OF SUPPLY			
Twp.	Rge.		Min.	Max.	Ave.	Hard	Med.	Soft	Corrode Casing	Unsuitable for Drinking	Adequate	Inadequate	Number used for Irrigation	Approximate Acres Irrigated
113	51	1	-	-	508	-	-	-	-	-	-	1	-	-
113	52	2	285	320	302	2	-	-	1	1	1	1	1	-
113	53	6	205	260	237	5	1	-	2	1	5	1	-	-
113	54	16	204	400	333	12	4	-	3	4	13	3	-	-
113	55	19	270	1360	544	14	1	3	5	9	17	2	-	-
114	51	7	220	475	302	6	1	-	3	1	7	-	-	-
114	52	None	-	-	-	-	-	-	-	-	-	-	-	-
114	53	2	240	347	293	-	1	1	-	-	2	-	-	-
114	54	11	240	365	315	7	2	-	-	3	9	2	-	-
114	55	19	225	1265	436	17	1	1	4	8	16	3	-	-
115	51	17	230	525	325	14	3	-	6	5	15	2	-	-
115	52	3	250	430	360	3	-	-	-	1	2	1	-	-
115	53	5	250	498	400	4	1	-	1	2	4	1	1	1/4
115	54	3	220	306	259	2	1	-	1	-	3	-	-	-
115	55	14	250	520	369	5	8	-	3	5	9	5	-	-
Total		125				91	24	5	29	40	103	22	2	1/4

HAMLIN COUNTY
Table 3.
DATA ON FLOWING WELLS

LOCATION		Number of Wells	DEPTH OF WELLS			CHARACTER OF WATER					ADEQUACY OF SUPPLY					
Twp.	Rge		Min.	Max.	Ave.	Hard	Med.	Soft	Corroded Casing	Unsuitable for Drinking	Adequate	Inadequate	Number used for Irrigation	Approx. Acres Irrigated	Ave. Gallon Per Min	Number Controlled
113	51	1	-	-	385	-	1	-	1	-	1	-	1	1/2	2	-
113	52	None	-	-	-	-	-	-	-	-	-	-	-	-	-	-
113	53	None	-	-	-	-	-	-	-	-	-	-	-	-	-	-
113	54	None	-	-	-	-	-	-	-	-	-	-	-	-	-	-
113	55	None	-	-	-	-	-	-	-	-	-	-	-	-	-	-
114	51	1	-	-	400	-	1	-	-	-	1	-	1	1	-	-
114	52	None	-	-	-	-	-	-	-	-	-	-	-	-	-	-
114	53	None	-	-	-	-	-	-	-	-	-	-	-	-	-	-
114	54	None	-	-	-	-	-	-	-	-	-	-	-	-	-	-
114	55	None	-	-	-	-	-	-	-	-	-	-	-	-	-	-
115	51	2	70	125	98	2	-	-	-	1	2	-	1	1/8	-	-
115	52	None	-	-	-	-	-	-	-	-	-	-	-	-	-	-
115	53	None	-	-	-	-	-	-	-	-	-	-	-	-	-	-
115	54	None	-	-	-	-	-	-	-	-	-	-	-	-	-	-
115	55	None	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total		4				2	2	-	1	1	4	-	3	1 5/8	-	-

Hamlin County Well Notes

The following are pertinent remarks quoted from questionnaires returned by farmers and are included opinions of the water situation as expressed by the individual farmers and must be so applied.

T.113N., R.54W. NW 1/4 Sec. 17	360 feet: (Drilled) "Shallow and bored wells do not seem to supply enough water."
T.114N., R.55W. SW 1/4 Sec. 31	16 feet: "Difficulty in construction account of quick sand."
T.115N., R.51W. SE 1/4 Sec. 9	92 feet: "Difficulty in construction account of caving in with 'sea mud'."
T.115N., R.54W. SW 1/4 Sec. 29	80 feet: "Difficulty in construction account of quicksand."
T.115N., R.54W. NW 1/4 Sec. 30	112 feet: "Have had difficulty in getting water. Have dug several wells. We need water badly."

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SOUTH DAKOTA STATE COLLEGE
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